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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/564,349	01/12/2006	Toshihiro Fukumoto	FUKUMOTO 5	9042
1444 7590 06/21/2007 BROWDY AND NEIMARK, P.L.L.C. 624 NINTH STREET, NW SUITE 300 WASHINGTON, DC 20001-5303			EXAMINER TRIEU, THAI BA	
			ART UNIT 3748	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No. 10/564,349	Applicant(s) FUKUMOTO ET AL.	
	Examiner Thai-Ba Trieu	Art Unit 3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the Preliminary Amendment filed on January 12, 2006. Claims 1-8 were amended.

For the purpose of this Office Action, the claims 1-8 will be examined as best understood by the examiner.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Claim Suggestions

Applicants are suggested to revise the claims 7-8 in the method claim format.

Claim Objections

Claim 2 is objected to because of the following informalities:

- In claim 2, line 3, "***crankshafts***" before "***by shortening***" should be replaced by – **a crankshaft** --.
- In claim 2, line 3, "***crankshafts***" after "***gyration of***" should be replaced by – **the crankshaft** --.

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- In claim 4, lines 2- 3, ***"the crankshafts"*** after ***"engine weight and"*** should be replaced by – **the crankshaft --**.

- In claim 8, line 5, ***"induction valve"*** and ***"exhausted valve"*** should be replaced by – **intake valve --** and -- **exhaust valve --** (*for consistency with the specification*).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, how "compressed air or the mixed fuel gas" is being planned and heated; in other words, which plan(s)/heat applicants are intended to use for the compressed air or the mixed fuel gas.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 and its dependent claims 2-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically,

1. In claim 1:

a. Lines 1-2, the recitation of "*structure to shorten the total length of piston and liner...*" renders the claim indefinite, since it is not clear that how short (i.e. 1 in; 1 mm, 1 cm etc...) the total length and liner are in order to obtain 2-4 times compressed air or the mixed fuel gas (air fuel mixture); or how short (i.e. 1 in; 1 mm, 1 cm etc...) if the structure of the instant application is to compared with the length and liner of the standard/normal cylinder of the internal combustion engines or of any other components? Applicants are required to clarify or to revise the claimed limitation.

b. Line 3-4, the recitation of "*compressed air or the mixed fuel gas as planned and heated*" renders the claim indefinite, since it is not clear that which plan(s) or heat is to be used for the compressed air and the mixed fuel gas. Applicants are required to identify the plan(s) and heat, or to revise the claimed limitations.

c. Lines 4-5, the recitation of "with the constant temperature and pressure" renders the claim indefinite, since it is not clear that which component(s) has/have the constant temperature and pressure? Applicants are required to clarify or to revise the claimed limitation.

2. In claim 2:

a. Line 2, "structure" is a double recitation.

b. Line 3, the recitation of "*by shortening radii of gyration of crankshafts*" renders the claim indefinite, since it is not clear that how short (i.e. 1 in; 1 mm, 1 cm etc...) the radii of gyration of the crankshafts; or how short (i.e. 1 in; 1 mm, 1 cm etc...) if the structure of the instant application is to compared with the standard/normal *radii of gyration of standard/normal crankshafts* of any other components? Applicants are required to clarify or to revise the claimed limitation.

c. Line 3, "crankshafts" is a double recitation.

3. In claim 3:

a. Line 2, "structure" is a double recitation.

b. Lines 3-4, the recitation of "*shortening liners and shortening radii of gyration of crankshafts*" renders the claim indefinite, since it is not clear that how short (i.e. 1 in; 1 mm, 1 cm etc...) the liners and the radii of gyration of the crankshafts; or how short (i.e. 1 in; 1 mm, 1 cm etc...) if the structures of the instant application are to compared with the standard/normal liners and the standard/normal *radii of gyration of standard/normal crankshafts* of any other components? Applicants are required to clarify or to revise the claimed limitation.

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4. In claim 4:

a. Line 2, "structure" is a double recitation.

b. Line 3, the limitation of "the oil pan" is insufficient antecedent basis for this limitation in the claim.

c. Lines 3-4, the recitations of "*decreasing of the capacity of the oil pan*" and "*decreasing of the lubricating oil*" render the claim indefinite, since it is not clear that how much the volume/capacity (i.e. 1 in³; 1 mm³, 1 cm³ etc...) and the amount/quantity of the lubricating oil need to be decreased. Applicants are required to clarify or to revise the claimed limitation.

d. Line 4, the limitation of "the decreasing of the lubricating oil" is insufficient antecedent basis for this limitation in the claim.

5. In claim 5:

a. Line 2, "structure" is a double recitation.

b. Line 2, the limitation of "the air tank" is insufficient antecedent basis for this limitation in the claim.

c. Line 4, the recitation of "*given conditions*" renders the claim indefinite, since it is not clear to which conditions (i.e. idling conditions, cruising condition, cold start condition, intake stroke, compression stroke, etc...) applicants want to reference. Applicants are required to clarify or to revise the claimed limitation.

6. In claim 6:

a. Line 2, the recitation of "a form of compressor" renders the claim indefinite since it is not clear that which form of the compressor is to be considered? Applicants are required to identify the specified pressure or to revise the claimed limitation.

b. Lines 4 and 6, "structure" is a double recitation.

c. Line 3, the recitation of "the specified pressure" renders the claim indefinite since it is not clear that which pressure is to be considered a specific one? Applicants are required to identify the specified pressure or to revise the claimed limitation.

d. Line 3, the limitation "the tank" is insufficient antecedent basis for this limitation in the claim.

7. In claim 7:

a. Line 2, "structure" is a double recitation.

b. Line 4, the limitation "the peroxidized exhaust gas" is insufficient antecedent basis for this limitation in the claim.

c. Line 6, the limitation "the infusion tube" is insufficient antecedent basis for this limitation in the claim.

d. Lines 8-9, the limitations "the carbon molecules" and "the hydrogen molecules" are insufficient antecedent basis for this limitation in the claim.

e. The recitation of "other harmless gases" renders the claim indefinite, since it is not clear that which other gases are considered as harmless gases. Applicants are required to identify the harmless gases or to revise the claimed limitation.

8. In claim 8:

a. The recitation of "the technology enabling the improvement ..." renders the claim indefinite, since it is not clear that which technology is considered to improve degree of freedom of the valve operation. Applicants are required to identify this technology or to revise the claimed limitation.

b. The recitation of "the simplification of the cylinder head" renders the claim indefinite, since it is not clear that which way is considered as a simplification of the cylinder head or which simple way the cylinder head is to be made/constructed? Applicants are required to identify the way of simplifying the cylinder head or to revise the claimed limitation.

c. Lines 2-5, the limitations of "the improvement", "the valve operation", "the simplification", "the cylinder head", "the movement", "the induction valve", "the exhausted valve" are insufficient antecedent basis for this limitation in the claim.

d. Line 6, the recitation of "the valve" renders the claim indefinite, since it is not clear that which valve(s) – intake/induction valve, or exhaust valve – is

being in operating condition. Applicants are required to identify which valve is in operating condition or to revise the claimed limitation.

e. Line 7, the recitation of "in faithful accordance" renders the claim indefinite, since it is not clear that which accordance is to be considered as a faithful one. Applicants are required to identify which accordance is to be faithful or to revise the claimed limitation.

f. Line 8, the recitation of "planned diagram" renders the claim indefinite, since it is not clear that which diagram is to be planned. Applicants are required to identify which diagram is to be planned or to revise the claimed limitation.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-8 are rejected under 35 U.S.C. 102(a) as best understood as being anticipated by Fukumoto et al. (Pub. Number JP 2002-309949 A).

Fukumoto discloses an engine having structure to shorten the total length of piston and liner by inhalation of the 2-4 times compressed air or the mixed fuel gas as planned and heated, into the liner, with the constant temperature and pressure (See

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Figures 1-5, Abstract, and Paragraphs [0002], [0003], [0014] and [0031] of a machine translation copy);

structure to reduce the movement area of crankshafts by shortening radii of gyration of crankshafts, and to reduce weight of crankshaft (See Paragraph [0016]);

structure to lighten its own weight of engine by using shortening liners and shortening radii of gyration of crankshaft to shorten cylinder block (see Paragraphs [0014] and [0030]);

structure to reduce the engine weight and the crankshafts, decreasing of the capacity of the oil pan, and the decreasing of the lubricating oil (See Paragraphs [0016]-[0017]);

structure to place the air tank (1) which stores compressed and heated air or the mixed fuel gas temporarily under given conditions and to make the gases inhale into cylinder liner (7) (See Figure 1, and Paragraph [0018]);

having a form of compressor for compressing the air or the mixed fuel gas to 2-4 times or more as the specified pressure, structure of valve for controlling a constant temperature of the compressed air or mixed gas and provision into the tank for storing temporarily, and structure of the temperature regulator (See Paragraph [0032]);

infusing the natural gas or the hydrocarbon gas (via 21 and 22) such as petroleum gas into the per oxidized exhaust gas with high temperature through the infusion tube and mixing evenly, reacting the environmentally harmful per oxidized nitrogen gas and carbon sulfide particle with the carbon molecules and the hydrogen

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molecules, reducing and resolving into clean nitrogen gas, water vapor, and other harmless gases, and pressing the exhausted gas (See Paragraph [0012] and [0029]);

the technology that enables the improvement of degree of freedom of the valve operation at the same time as the simplification of the cylinder head by controlling the movement of the induction valve and the exhausted valve by driving oil-hydraulic pump, operating the valve by in-vehicle microcomputer in faithful accordance with the planned diagram (See Paragraph [0033]), and not using valve operation by the camshaft (See Figures 1-5).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Pong (US Patent Number 6,196,181 B1) discloses a compact internal combustion engine.
- Plechner (US Patent Number 6,145,488) discloses a reduced volume scavenging system for two cycle engines.
- Paul et al. (US Patent Number 4,791,787) disclose a regenerative thermal engine.
- Lutz (US Patent Number 4,630,345) discloses a method for manufacturing a cylinder for a cylinder piston combustion engine.
- Bachmann (US Patent Number 4,359,016) discloses an internal combustion engine.

- Bachmann (US Patent Number 4,285,304) discloses an internal combustion engine.
- Nakano (Patent Number JP 05-059962 A) discloses a trunk piston type diesel engine.
- Terenzi (Pub. Number GB 2021236 A) discloses a cylinder bore reducing assembly.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thai-Ba Trieu whose telephone number is (571) 272-4867. The examiner can normally be reached on Monday - Thursday (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TTB
June 10, 2007

A handwritten signature in black ink, appearing to read 'Thai-Ba Trieu', with a long horizontal flourish extending to the right.

Thai-Ba Trieu
Primary Examiner
Art Unit 3748